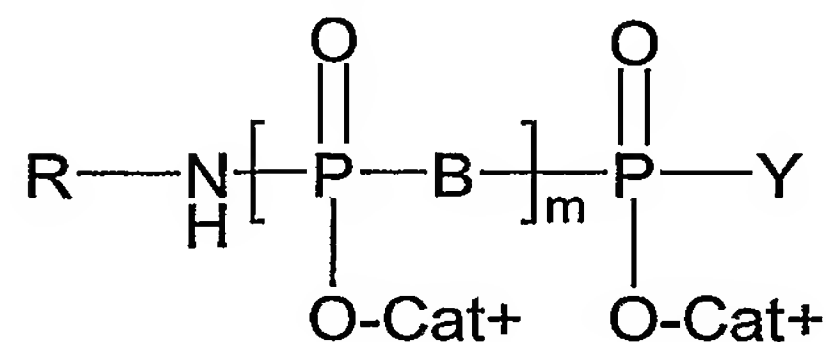


CLAIMS

1. A $\gamma\delta$ T cell activator of formula (I) :



Formula (I)

5 wherein Cat⁺ represents one (or several, identical or different) organic or mineral cation(s) (including proton);

m is an integer from 1 to 3;

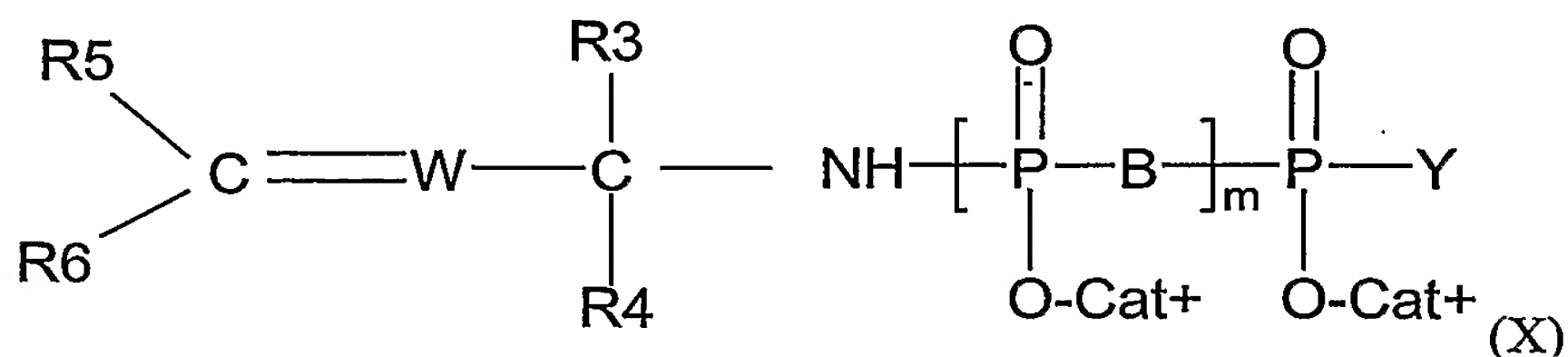
B is O, NH, or any group capable to be hydrolyzed;

10 Y = O⁻Cat⁺, a C₁-C₃ alkyl group, a group -A-R, or a radical selected from the group consisting of a nucleoside, an oligonucleotide, a nucleic acid, an amino acid, a peptide, a protein, a monosaccharide, an oligosaccharide, a polysaccharide, a fatty acid, a simple lipid, a complex lipid, a folic acid, a tetrahydrofolic acid, a phosphoric acid, an inositol, a vitamin, a co-enzyme, a flavonoid, an aldehyde, an epoxyde and a halohydrin;

A is O, NH, CHF, CF₂ or CH₂; and,

15 R is a linear, branched, or cyclic, aromatic or not, saturated or unsaturated, C₁-C₅₀ hydrocarbon group, optionally interrupted by at least one heteroatom, wherein said hydrocarbon group comprises an alkyl, an alkylenyl, or an alkynyl, preferably an alkyl or an alkylene, which can be substituted by one or several substituents selected from the group consisting of : an alkyl, an alkylenyl, an alkynyl, an epoxyalkyl, an aryl, an heterocycle, an alkoxy, an acyl, an alcohol, a
20 carboxylic group (-COOH), an ester, an amine, an amino group (-NH₂), an amide (-CONH₂), an imine, a nitrile, an hydroxyl (-OH), a aldehyde group (-CHO), an halogen, an halogenoalkyl, a thiol (-SH), a thioalkyl, a sulfone, a sulfoxide, and a combination thereof.

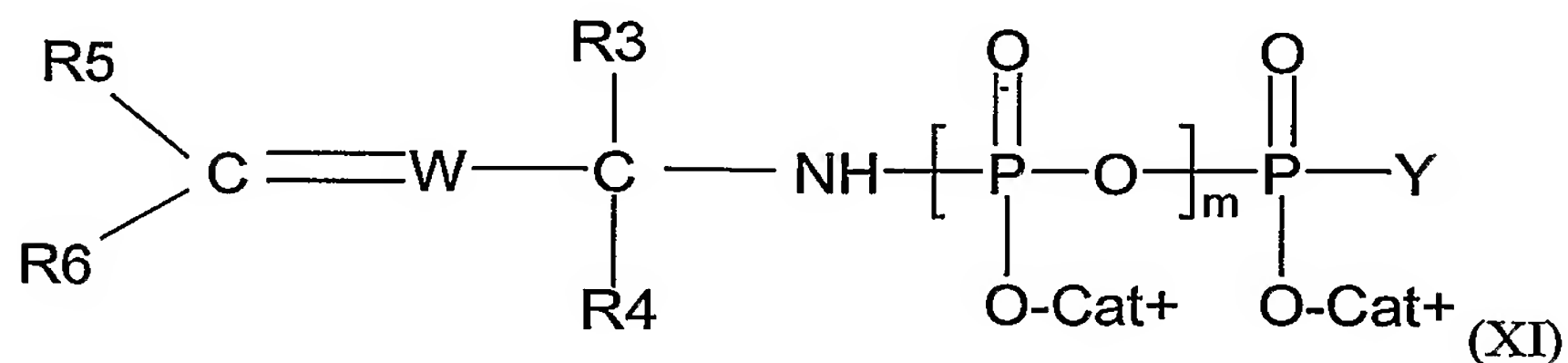
25 2. The $\gamma\delta$ T cell activator according to claim 1, wherein said activator is a compound of formula (X) :



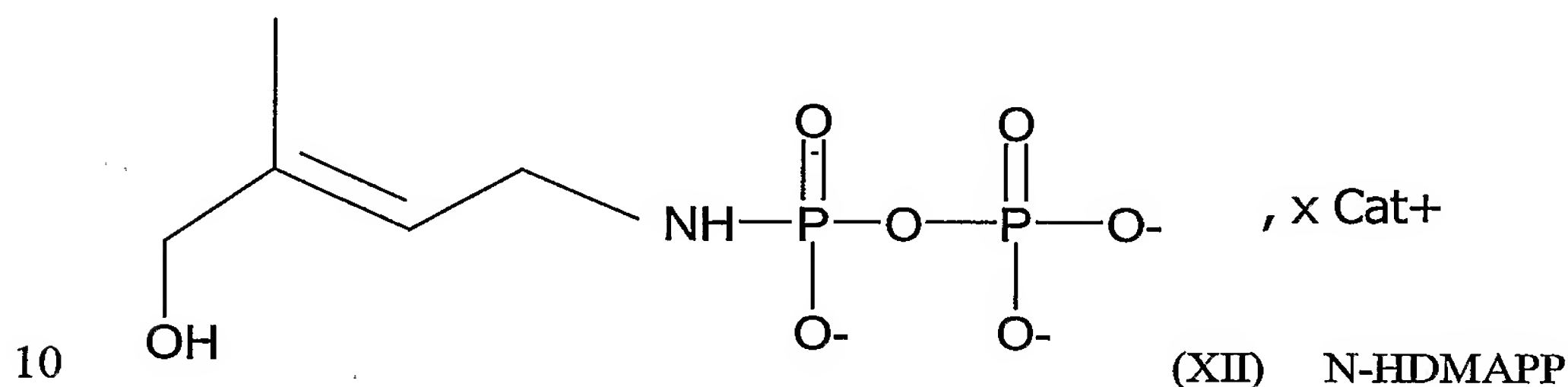
in which R₃, R₄, and R₅, identical or different, are a hydrogen or (C₁-C₃)alkyl group, W is -CH- or -N-, R₆ is an (C₂-C₃)acyl, an aldehyde, an (C₁-C₃)alcohol, or an (C₂-C₃)ester, Cat⁺ represents one (or several, identical or different) organic or mineral cation(s) (including the proton), B is O or NH,

m is an integer from 1 to 3, and Y is O⁻Cat⁺, a nucleoside, or a radical -A-R, wherein A is O, NH, CHF, CF₂ or CH₂, and R is selected from the group consisting of 1), 2) or 3).

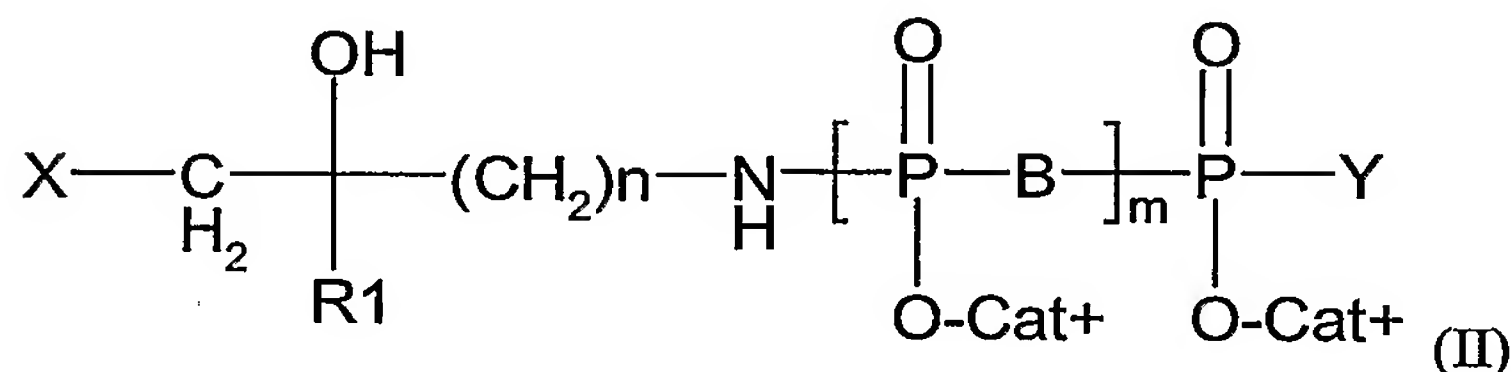
3. The $\gamma\delta$ T cell activator according to claim 2, wherein said activator is a compound of formula (XI)



4. The $\gamma\delta$ T cell activator according to claim 3, wherein said activator is a compound of formula (XII)

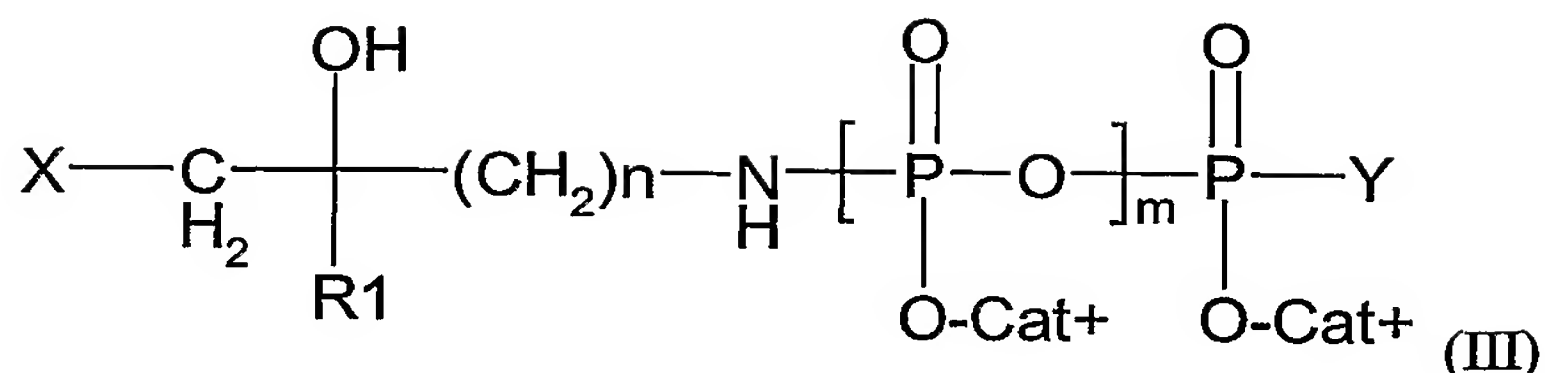


5. The $\gamma\delta$ T cell activator according to claim 1, wherein said activator is a compound of formula (II):



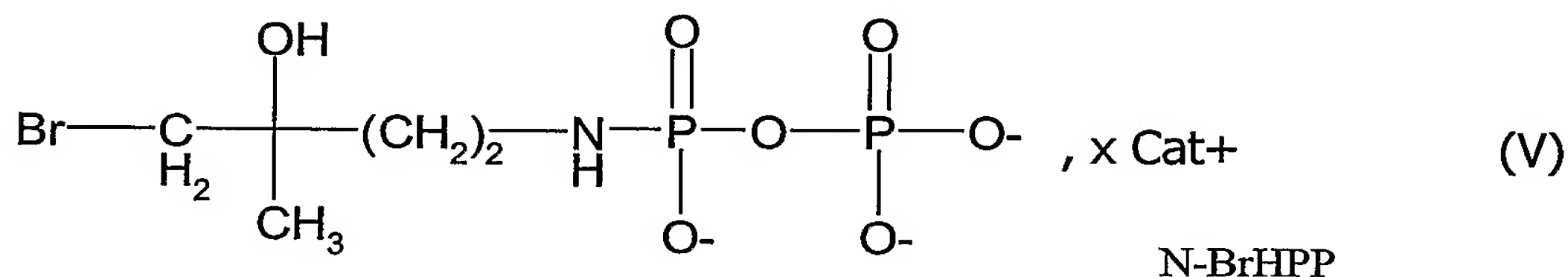
in which X is an halogen (preferably selected from I, Br and Cl), B is O or NH, m is an integer from 1 to 3, R1 is a methyl or ethyl group, Cat⁺ represents one (or several, identical or different) organic or mineral cation(s) (including the proton), and n is an integer from 2 to 20, and Y is O⁻ Cat⁺, a nucleoside, or a radical -A-R, wherein A is O, NH, CHF, CF₂ or CH₂ and R is selected from the group consisting of 1), 2) or 3).

6. The $\gamma\delta$ T cell activator according to claim 5, wherein said activator is a compound of formula (III)



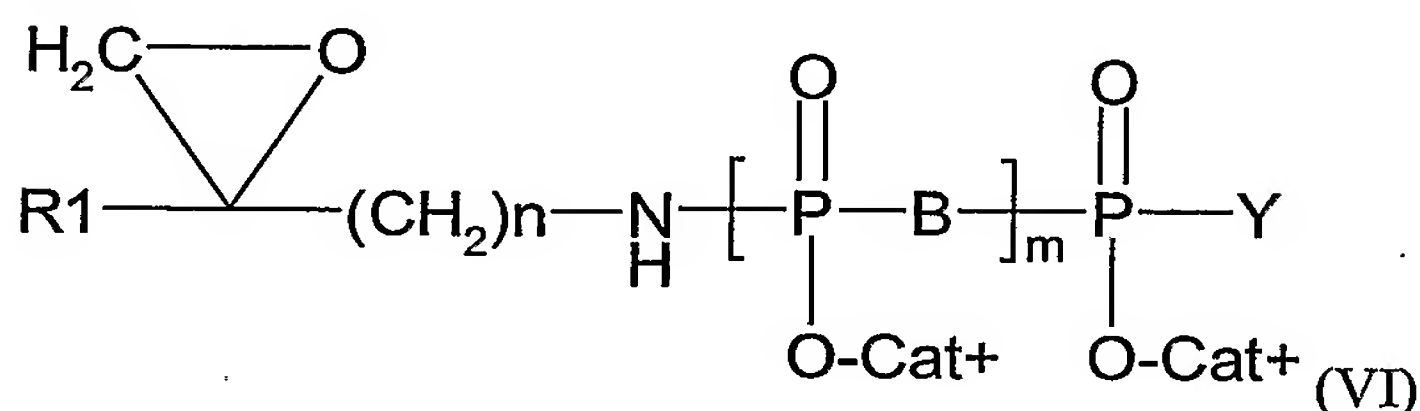
7. The $\gamma\delta$ T cell activator according to claim 5, wherein said activator is a compound of formula (V)

5



8. The $\gamma\delta$ T cell activator according to claim 1, wherein said activator is a compound of formula (VI):

10



in which R1 is a methyl or ethyl group, Cat⁺ represents one (or several, identical or different) organic or mineral cation(s) (including the proton), B is O or NH, m is an integer from 1 to 3, and n is an integer from 2 to 20, and Y is O⁻Cat⁺, a nucleoside, or a radical -A-R, wherein A is O, NH, CHF, CF₂ or CH₂, and R is selected from the group consisting of 1), 2) or 3).

15

9. A pharmaceutical composition comprising a $\gamma\delta$ T cell activator according to any one of claims 1-8.

10. Use of a $\gamma\delta$ T cell activator according to any one of claims 1-8 for the manufacture of a pharmaceutical composition for regulating $\gamma\delta$ T cells in a human subject.

20

11. Use of a $\gamma\delta$ T cell activator according to any one of claims 1-8 for the manufacture of a pharmaceutical composition for treating a subject suffering from or susceptible to suffering from a cancer, an infectious disease, an autoimmune disease or an allergic disease.

25

12. Use according to claim 11, wherein said cancer is a solid tumor.

13. Use of a $\gamma\delta$ T cell activator according to any one of claims 1-8 as a vaccine adjuvant.
14. A vaccine composition comprising a $\gamma\delta$ T cell activator according to any one of claims 1-8 as a vaccine adjuvant.
- 5
15. A method for preparing a diphosphoramidate monoester compound comprising:
- (a) reacting an alkylhalide R-X in a coupling step with a diethylphosphoramidate or diethylchlorophosphate reagent;
 - (b) reacting the compound prepared in step (a) in a saponification step thereby removing O-ethyl groups; and
 - (c) reacting the compound prepared in step (b) in a phosphorylation step thereby preparing a diphosphoramidate monoester,
- 10
- wherein R is a linear, branched, or cyclic, aromatic or not, saturated or unsaturated, C1-C50 hydrocarbon group, optionally interrupted by at least one heteroatom, wherein said
- 15 hydrocarbon group comprises an alkyl, an alkylenyl, or an alkynyl, preferably an alkyl or an alkylene, which can be substituted by one or several substituents selected from the group consisting of : an alkyl, an alkylenyl, an alkynyl, an epoxyalkyl, an aryl, a heterocycle, an alkoxy, an acyl, an alcohol, a carboxylic group (-COOH), an ester, an amine, an amino group (-NH₂), an amide (-CONH₂), an imine, a nitrile, an hydroxyl (-OH), a aldehyde group (-CHO), an halogen, an
- 20 halogenoalkyl, a thiol (-SH), a thioalkyl, a sulfone, a sulfoxide, and a combination thereof, and
- wherein X is a moiety capable of being displaced by a diethylphosphoramidate group under suitable conditions.
16. The method of Claim 15 wherein X is an NH₂ group and said R-X compound is reacted in a
- 25 coupling step with a diethylchlorophosphate compound.
17. The method of Claim 15 wherein X is selected from the group consisting of I, Br and Cl.
18. A method of preparing a (E)-2-(4-azido-2-methylbut-2-en yloxy)tetrahydro-2H-pyran
- 30 compound, comprising providing a (E)-2-(4-Chloro-2-methylbut-2-en yloxy)tetrahydro-2H-pyran compound and reacting said compound with a sodium azide in a water-pentane biphasic mixture in the presence of phase transfer catalyst.
19. A method of activation a $\gamma\delta$ T cell, the method comprising bringing a $\gamma\delta$ T cell into contact with
- 35 a $\gamma\delta$ T cell activator according to any one of claims 1-8.
20. The method of claim 19 wherein the $\gamma\delta$ T cell is brought into contact with said $\gamma\delta$ T cell activator in vitro.

21. A $\gamma\delta$ T cell activated according to a method of claims 19 or 20.

22. Use of a $\gamma\delta$ T cell according to claim 21 for the manufacture of a pharmaceutical composition.